AMERICAN DYESTUFF REPORTER

A Weekly Publication devoted to

DYESTUFFS, COLORS and ALLIED CHEMICALS

"Circulated Everywhere Dyestuffs are Used"

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The Production of Coal Tar Crudes in America

How Crudes Are Recovered from Coke Oven Gas—The Increasing Use of the By-Product Coke Oven in America

IN a general way, everyone connected with the textile industry in America knows that the manufacture of aniline dyes is dependent upon basic coal-tar products. In many cases, however, we have found that the relationship of the production of finished dyestuffs to the intermediate and basic materials from which they are produced and the manner in which the so-called crudes are obtained from coal, is but imperfectly understood. It would seem, therefore, that an elementary account of these fundamental processes, together with some outline of the possibilities for the manufacture of crudes and intermediates which exist in America, might prove interesting to readers of the Reporter.

Practically all of the basic materials essential to the manufacture of aniline colors are by-products of the coking industry. The manufacture of coke from coal, as is very generally known, is a primary essential of the iron and steel industry of the country. In past years it was customary for coke to be made by independent companies and sold to the large iron and steel interests. At the present time, however, a great majority of the coke ovens of the country are owned and operated directly by the steel companies. The original American method of producing coke was in an oven which, by its nature, destroyed a great part of the by-products which have been for many years retained and put to valuable use by the more modern by-product ovens in general use in European countries.

Increasing Use of By-Product Coke Oven

AT the outbreak of the war, it is stated that only about 25 per cent. of the coke manufactured in America was produced in by-product ovens. Since the beginning of the war, however, because of the greatly increased domestic demand for these by-products and the inability to secure them from Central European countries, by-product ovens have been rapidly installed and to-day we believe that between 50 per cent. and 60 per cent. of American coke is produced in by-product ovens.

In a broad way, the by-products derived from the carbonization of coal into coke may be divided into five classes—ammonia, gas, light-oils, cyanogen and tar. With only two of these, namely gas and light-oils, is the dyestuff industry primarily concerned. It

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is true that small quantities of products useful in the dyestuff industry are obtained from tar, but they are so small as to be safely disregarded for practical purposes.

The chief basics for the manufacture of dyestuffs are bensol and toluol. These products are generally classed with the light-oils altho, as a matter of fact, their recovery is obtained in greatest volume from the washing of the gas rather than from the tar itself. Coke oven gas may be profitably utilized for illuminating or fuel purposes but it is also possible to recover certain of its constituents without destroying its value for these purposes. Roughly speaking, the recovery of perhaps 2½ gallons of light-oil may be had from one ton of coal carbonized.

Benzol Recovery

CHIEF among the constituents of light-oil is benzol. Its recovery is a comparatively simple matter and is based upon the property of certain high-boiling oils to absorb the crude benzol vapors from the gas and to yield them up again when heated to a temperature below their own boiling point. The washing of oven gas with oil, for benzol, is practically parallel to the washing with water to recover ammonia, the guiding principle being to bring the gas into intimate contact with a maximum surface of the cool washing liquid. The benzol vapors, when released from the washing oil and condensed, contain from 10 to 15 per cent. toluol and from 45 to 55 per cent. benzol, with small amounts of xylol and naphthalene. From this crude light-oil the refined products are obtained by successive distillation. Benzol, in addition to furnishing raw material for a large portion of the chemical and dyestuff industry, is also an extremely practical motor fuel and can be readily used as a substitute for gasolene if an over-production in this country should develop.

Naphthalene, although chemically of an entirely different nature from benzol and toluol, is generally classed in the light-oil fraction and forms the crude material from which many important colors are derived.

Until the war demands for benzol and toluol arose, their uses in America were comparatively limited. Since the outbreak of the war, however, toluol, the base from which trinitrotoluol—the famous T.N.T.—is made, has, of course, been in tremendous demand and benzol has been in nearly equal demand for the manufacture of picric acid and aniline oil. This demand has, of course, been responsible for the steady

(*Continued on page* 19)

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HOW THE DYESTUFFS CRISIS WAS MET

THE WORK OF AMERICAN SCIENCE, CAPITAL, AND INDUSTRY—WHY GERMANY CANNOT AGAIN CONTROL OUR COLORS—ONLY STAPLE SHADES AVAILABLE YET, BUT THE WHOLE SPECTRUM ON THE WAY

By ELLWOOD HENDRICK

Author of "Everyman's Chemistry"

IN 1915 the textile mills of the United States were about to close down for lack of dyes. There were more than 900 artificial dyestuffs in general use and the market was bare. The situation was serious. Agents of German houses could not import without returning cotton or copper or something needed by Germany for purposes of war, and that was not allowed. The situation was very like that of a farmer's wife who wants to bake a pie. She needs flour and lard and salt and eggs and, let us say, apples. Across the road is a field of wheat, back of the house is an apple orchard, there are pigs in the pen and chickens on the roost, but she has neither flour nor lard nor eggs nor apples. The United States, like the rest of the world, used to buy its colors ready-made, and it got them mostly from Germany. The native American coal-tar dyestuff industry was represented by the Schoellkopf Works in Buffalo, Heller & Merz in Newark, the W. Beckers Works in Brooklyn, and four smaller establishments, one of which was owned in Germany. The first three, despite the German names, were thoroughly American concerns, struggling along as best they could against hot competition from Germany—yet having to buy most of their materials from that country. Everything to make them of—to make the things that correspond to flour and eggs and lard and apples, if we are thinking of pie instead of dyestuff—was here in abundance. The Hudson River Works was purchased a number of years ago by the Bayer Co., of Elberfield, and so far as I am aware it is still owned in Germany. It had nearly ceased to make colors and was making drugs, as a more profitable enterprise.

This article, which appeared originally in the World's Work for March, 1918, has been widely commented upon as being the most satisfactory summary of the development of our American Dyestuff Industry which has appeared up to date. We believe that readers of the Reporter will find it well worth reading.

In regard to intermediates, which are the coal-tar materials out of which dyes are made, the condition was interesting. The iron and steel industry had attained great proportions, but right here we meet the text of many sermons preached by scientific men before the war. American business men—not as individuals but as a great class—were not sufficiently hospitable to applied science. There was plenty of boasting but still more neglect. We find an example in the making of coke for blast furnaces. It was made mostly in bee-hive coke ovens in which all the gas, ammonia, and tar are destroyed. Only a small percentage was made in by-product coke ovens in which these are saved. It was very wasteful to destroy all these valuable products to make coke, but we have always been lavish in this country and are less distressed by the consciousness of waste than other peoples.

In 1909 three interested companies started the coal-tar intermediate industry. These were the Solvay interests

of Syracuse, which make soda and, through an allied corporation, build and operate by-product coke ovens; the Barret Co., which buys tar, refines it, makes roofing and other tar products —the so-called crudes—and the General Chemical Co., which is a large producer of acids, which are needed at every step. They knew that by-product ovens were sure to replace the bee-hive type in time, because of the saving of gas and the increasing value of gas fuel, and they organized the Benzol Products Co., secured competent management and began to make aniline oil at Frankford, Pa., making about 200,000 lbs. per month. This is merely one of a great many coal-tar intermediates, but it is largely used. The writer of this article had made aniline oil at Albany in 1883, but his company did not last. Dr. Jayne, the elder, of the Barret Co., had also undertaken to make it, but not for long. This new establishment, however, had such financial strenght back of it that the alarm was sounded in Germany and they flooded the American market with aniline at less than cost. It was a losing proposition, but the American owners stuck to it, while the Schoellkopf Works and Heller & Merz continued to buy and use the American product. Congress put a duty on aniline, but the Germans discounted the duty and continued to sell below cost. The fight was still on when the war broke loose. A great deal of aniline is used by textile mills for black dye. Before the war more than 12,000,000 lbs. were used annually, but the American mills generally used the German product.

THE SCIENCE OF DYEING

To get the dyestuff situation clear in our minds we must note another fact. Dyeing is an art, but it is also a science. "Don't talk about theories, give us practical men," has been the slogan of the American business man for many years—and yet theory is the basis of science. The textitle industry participated in this attitude, despite the fact that there were far-sighted mill men who combated the anti-scientific

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heresy and established such splendid institutions as the textile schools at Philadelphia and Lowell. The application of dyes to fibres in this country is still in transition from a trade to a professional calling. The agencies of German houses, some of which were American and some German-owned, gave service along with the goods they sold. They sent textile chemists around to the mills to teach the dyers how to work with their products and to get the best results. This established very close relations between many of them and the agents of German manufacturers. The relationship was made all the closer because in many mills there is not a chemically-trained man in the whole establishment. I am not speaking of the great, progressive manufacturing concerns whose works are models of efficiency, neverthless I am describing a vast number of American textile mills.

Then came the war, and in 1915 the strain was on. The market was bare. A few importers started in to manufacture in a small way, but to this day the main product is from American factories that have developed as we shall soon see. We were still in the position of the farmer's wife who wanted to make pie and had nothing nearer to her ingredients than a field of wheat and an apple orchard. Munitions had to be made and they call for coal-tar intermediates. Water-gas, so largely produced in this country, yields no tar, and tar products were needed in the worst possible way. So by-product coke ovens were substituted for the bee-hive type as fast as they could be built, and now about 50 per cent. of our coke is made by the modern process. The owners of the one concern that made intermediates plunged in and built for the future. This concern is now producing more aniline alone than was formerly used in the entire country. The Du Ponts, with their great research laboratory and chemical staff, became tremendous users of coal-tar products, and it goes without saying that their handling of these is competent and intelligent. The Merrimac Chemical Co. near Boston and the Newport Chemical Co. in Wisconsin began to make intermediates, and so did Marden, Orth & Hastings, and the Butterworth-Judson Co. of Newark.

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A SERIOUS ECONOMIC QUESTION

In the meantime the dyestuff situation was desperate. Schoellkopf and Beckers were working three shifts and throwing back into extensions every penny of the big profits they made. The same may be said of Heller & Merz. Sherwin, Williams & Co., paint makers in Chicago, had to have certain colors for pigments and, as they could not buy them, they made them and are now producers. The big printing ink concern of Ault & Wiborg of Cincinnati could not buy, so they built and built well and are now producing. Dow of Michigan is already making indigo. Marden, Orth & Hasting of Newark are producing a considerable line. So is John Campbell and also the Butterworth-Judson Co. Herman A. Metz, formerly one of the leading importers, is manufacturing in two factories, and the Hudson River Works of the Bayer

Co. at Rensselaer, N. Y., has gone back to making some colors again. The brothers Blum of the United Piece Dye Works at Paterson needed some colors for silk which they could not procure, and now they are producing some for the market. The Arnold Print Works at North Adams, Mass., is making a few of the dyes that it needs. And there are a vast number of other makers, some putting out only one or two colors and others more. The Du Pont interests are building on a very large scale to make indigo and other colors. Much the largest producer of dyestuffs is the National Aniline & Chemical Co., Inc., which now includes the Schoellkopf Works of Buffalo, the W. Beckers Works of Brooklyn, the Standard Aniline Works at Wappingers Falls, N. Y., the Benzol Products Co. at Marcus Hook, Pa., and the research plants, for products specifically needed, of the General Chemical, Barrett, and Solvay companies, all of which are large shareholders. An interesting note in this connection is that a large participant in the Solvay companies at Syracuse is Ernest Solvay of Brussels, who saved that city by the payment of the great indemnity, said to be $6,000,000, to the German invaders to save that city from the fate of Lovain. Syracuse, N. Y., helped to save Brussels, Belgium.

Well, then, what is the situation today? Are American makers producing all the colors formerly obtained from Germany? Very emphatically they are not. Are those that they make as good as those made in Germany? Yes, the same thing is the same thing, no matter where it is made. The only qualification to this statement is that there has been, under slap-dash rush of work, an occasional lack of regularity of product, but among responsible makers this is well overcome. There is no serious defect in the quality of dyestuffs made by the best American makers. *The shortage is in variety.* Some colors are good for wool, others for cotton, others for silk, and others for two or more fabrics. Some are faster to light, others to washing, and some are not particularly fast but dye evenly, which is a great desideratum. Others are needed for the pure beauty of shade which they produce. There is no such thing as an absolutely fast color and there never has been, from Gothic times to ours. The greatest fastness in dyes to light, washing, and bleaching is found in certain products of coal tar.

THE REASONS FOR THE SHORTAGE

Now let us explain why the different varieties are not coming out more rapidly. Some are easy to make and there are little factories all over the country making them. When it ceases to pay they will stop business. Others are exceedingly difficult and involve eight, ten, a dozen or more processes, every one of which is of the greatest delicacy and is full of chemical tricks. Sometimes one product may be obtained, but as we advance in complexity there are two, three, and more different products resulting from one process. By what amounts to chemical chicanery—to use a bad word for good practices—we can increase the yield of one over the other

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occasionally, but this has its limitations whether the process is carried out here or in Germany. Therefore, uses must be found for these by-products, or else the cost of the thing obtained is entirely too high. Some dyes imported before the war were not made because of their merits but rather to use up the by-products of some manufacturer. They were made in limited quantities and only brought high prices when some special use for them was found. There is a possibility that greater control in yields may be developed, and in the lines of thought that lead to such control American chemists are among the world's leaders.

What scientific men engaged in this pursuit like to do best is to work out new and improved colors; those that are lovelier in shade of faster to light or washing or that dye more evenly than any that are known. That is a line of effort at once pleasing and profitable. But conditions do not allow it. Mills must be supplied and the old colors must do until immediate problems are met.

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Remember, please, that dyestuffs are not made by a "formula." In the case of a color very much needed but never made in America before, it must first be produced in the laboratory. Knowledge of what it is and even how to produce it is not enough; it must be produced so as to furnish an adequate yield. There may be half a dozen ways of making it, but the problem is to discover the best way—a way that is economical. When that is worked out the matter is turned over to the works and here again there is testing to be done, because the conditions of mass, pressure, temperature, surface, and what-not are all different in the works from in the laboratory. When this is completed and factory methods are determined upon, it is very often necessary to set up special apparatus and new machinery which, under wartime conditions, is seldom to be obtained as soon as it is wanted.

And there are other difficulties. For example, to make the color that is wanted, bodies are required that cannot be produced alone, and if every thing that is made is thrown away except that which is needed, the whole undertaking is unprofitable. So the problem of working up the products that appear on the side, as it were, is likely to be present, and the laboratory must find uses for them. The situation is something like that of a clothing merchant who is compelled to buy suits to meet a demand for trousers. The situation is met, time and again, but it stands in the way of haste.

A visit made by the writer to the research laboratory of one of the largest works showed how the subject is undertaken by American chemists today. Not only is there provision made for research in the manner provided in the great German works, but it is fair to say that they have gone even further in providing for research in pure science than has been undertaken anywhere in the manufacture of these products. These provisions are for the future and it is a fair guess that when the war is over and there is time to turn around and work for the fun of it, this country will be a leader

rather than a follower. In the greatest of American industrial research laboratories pure science goes hand in hand with that which is applied.

Now let us take a glance toward the future. Turkey red will be on the market early next year; so will hydron blue. The fast anthracene colors are coming along, but we must not be in too much of a hurry for them. Synthetic indigo is here in a small quantity and next year it will be available in large quantities. It is doubtful if the 10,000,000 pounds and more yearly needed here will be made immediately, but in the meantime we have natural indigo coming in from China and the East. It is not as pure as that made artificially, but—these are war times. The whole list of dyes made from toluol, which are among the most valuable, must be practically omitted for the present. The toluol goes to war as T. N. T. [trinitrotoluol, the high explosive], and that is more important than dyestuffs.

PLENTY OF CRUDE MATERIALS

The great big thing about the industry is that there are now enough by-product coke ovens in the country to furnish all the crude materials needed—except toluol during the war. That means that we shall not have to go abroad for them any more. The next is that great American chemical manufacturers have taken up the production of intermediates and these are now made, some in abundance, some in small quantities,—but others not yet —right here in the United States. And the third is the splendid equipment of great American works owned, controlled, operated, and manned by our own citizens. They are still too much rushed by the problem of keeping the mills moving, and they are a little out of breath, but they are going strong.

Then what are we to expect after the war? Let us leave all discussion of the tariff out of consideration in this article. There is a very able tariff commission in Washington, and since everybody knows how the industry may be killed by German dumping let us not consider it at this time. What the industry must have is the support of those who use dyes. An insistent demand for dyestuffs that were convenient for special purposes but which are not actually necessary will throw the business back into German hands again because it prevents American manufacturers from making the things most urgently needed. If the users of dyes will work together with American manufacturers with good will, the American makers will solve their problems for them, because they have at their command the best staff of textile chemists in the country. Despite the fact that vast fortunes have been put into plants for future work, the industry can endure only if users and makers of dyes work together until in time all the colors really needed will be available. I cannot emphasize too strongly that the present trouble is not in quality but in variety, and this will care for itself as time goes on and one after another of the missing dyes is brought out. In June last year there occurred the consolidation, to which we have referred, of several great American works into one corporation. The two largest dye-making concerns in the country which were parties to the combination were running at 100 per cent. capacity. To avoid duplication, production in one of the two was reduced to 40 per cent. capacity by transfer of some of its lines to the other, and enlarging the units of the latter. By November, the first had increased again to 100 per cent. capacity, having filled its works with the manufacture of dyes that had not been made here before but were urgently needed.

The manufacture of coal-tar dyestuffs is the last cry in chemical industry. It is the most complex, the most scientifically erudite and difficult of all of them. It has saved the textile situation. It has been built for the future. It is organized with a view to progress in America. America needs it for her scientific development and standing, for preparedness, and because it is nationally unwholesome to let any other people control us. It is altogether a good thing for us and it is well worth the keeping.

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Dye Products and Chemical Co. Products

ACCORDING to information received from the Dye Products and Chemical Co., Inc., their plant at Newark, N. J., which was opened in 1915, began operations by the manufacture of Aniline Oil, which was commercially produced in that year.

During the year 1916 the following products, among others, were produced: Bismarck Brown R, Bismarck Brown Y, Chrysoidine R, Chrysoidine Y, Toluidine and Naphthol Green.

During the year 1917 the capacity of the plant was considerably increased and the following intermediates and colors were added to the products already being manufactured: Meta Toluylene Diamine, Meta Phenylene Diamine, Para Phenylene Diamine, Amino Azo Benzene, Alizarine Blue Black, Alizarine Yellow G, Ponceau Scarlet, Fast Acid Yellow, Chrome Red, and several other chrome colors.

Williamsburg Chemical Company Now Offers a New Color

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Their initial product was Sulphur Black. They lost little time in perfecting a good black, which they sold in large quantities for domestic and export. As a result they have obtained the significance of being one of the largest and most efficient manufacturers of that product.

They then ventured into the manufacture of Malachite Green, which instantly proved a great asset to the domestic and foreign markets. They are selling to-day more of this color than was imported into this country previous to the outbreak of the war.

It then occurred to them that the manufacture of Potassium Permanganate would be of great advantage to the country, and they put all their energy into producing this product. They now have an equipment which will supply a good-sized demand.

They have also taken up the manufacture of Auramine, Sulphur Brown, and Sulphur Khaki, which they are now supplying in quantities to our American users.

In order that they show something new for the forthcoming exhibition at the Grand Central Palace, they have hurried the completion of a Brilliant Green, W.

According to their advices, they are at present ready to fulfill orders on this product.

The company is preparing for the manufacture of a number of other very much wanted chemicals and dyestuffs, the production of which will help build up a strong National dyestuff industry, and, with the help of the public, this industry will survive and remain under the American Flag.

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AMERICAN DYESTUFF REPORTER
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Pointed solely toward the welfare and growth of the American Dyestuff Industry. Unbiased contributions appreciated.

MYRON DREW REESER, Managing Editor

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THE AMERICAN DYESTUFF REPORTER extends a most hearty welcome to visitors at the Textile Exhibition. Naturally, we are more interested in the dyestuff industry than in other departments of textile manufacture. We believe that the exhibits shown at the Grand Central Palace by many of the leading manufacturers of dyestuffs will go far toward persuading those who are able to inspect them that the American dyestuff industry has come to stay and that the progress which has been made up to the present time is truly remarkable when all the tremendous difficulties in the way of the establishment of this industry in America are taken into consideration.

We hope that this issue of the REPORTER will, in some small measure, aid in spreading an honest interest in the American dyestuff industry among textile manufacturers. It has not been our aim to deal with technical subjects at this time. We have felt that a majority of the people who visit the Textile Exhibition will be not so much professional dyers as men interested in textiles from other standpoints. For their information we have endeavored to give, in a broad way, an account of what has been accomplished by American dyestuff manufacturers and of what may be expected of them in the future. Before the outbreak of the war there was less known about the dyestuff industry in America than about any other industry on which the manufacture of textiles is equally dependent. In order to have this great industry become truly American there must be spread broadcast throughout the nation a geat deal of general information with regard to the fundamental processes of dyestuff manufacture to the end that a broad spirit of co-operation and support may be propagated among all who are in any way connected with the consumption of dyestuffs—and this includes practically every citizen of these United States.

We will be glad to welcome any of our readers from out of town at our booth No. 374, on the fourth floor. Any courtesy which it is within our power to show will be extended with the greatest of pleasure. We sincerely trust that our visitors will be numerous and that we may be afforded an opportunity to co-operate with all who are seeking information of any sort in regard to dyestuffs and their uses.

Enclosed with this issue will be found a subscription blank. We trust that those of our friends who have found the REPORTER interesting and useful will avail themselves of this opportunity to assist the publishers in broadening and extending its sphere of usefulness. It must be remembered that only by the receipt of tangible evidence to that effect are we able to know that our efforts in behalf of the dyestuff consumers of the country are appreciated. Moreover, the publications devoted to our infant industry need support just as much as does the infant industry itself. If you believe in a protective tariff for American-made dyestuffs and the enactment of anti-dumping legislation—send in your three dollars for fifty-two issues of the REPORTER, and help the good work along.

In our issue of last week we asked consumers to advise us as to what particular colors they felt to be most needed at the present time. This information is desired by a large manufacturing firm which has ample facilities but wishes to direct its energies where they will do the greatest good. They have asked the REPORTER to help them determine the nature of the colors upon which they should concentrate and we in turn ask for your opinion. We thank those who replied to last week's query but would appreciate a more general expression of opinion. Won't you let us know what colors you feel are needed at the moment, and so possibly help us to see that the need is met?

DU PONT AMERICAN INDUSTRIES IN THE DYESTUFF FIELD

COMPANY WILL MAKE NO ANNOUNCEMENTS UNTIL COLORS ARE BEING PRODUCED COMMERCIALLY. WILL CONCENTRATE ON RARE COLORS. PERMANENT AMERICAN INDUSTRY ASSURED.

THE entrance of the Du Pont interests into the field of aniline dye making is unquestionably an event of highest importance to this industry. When history is written and the permanent establishment of an American Dyestuff Industry has become an accomplished fact, it is more than probable that the Du Pont Company will be found to have played a leading rôle in making possible this accomplishment.

Feeling the truth of this prediction and realizing the incompleteness of any history, however brief, of the dyestuff industry in America which included no account of the Du Pont activities in this line, the writer recently called on N. R. Poucher, director of the dyestuff sales department of E. I. Du Pont de Nemours & Company, at his office in Wilmington. It was the writer's hope that Mr. Poucher would authorize the publication in the REPORTER of a complete narrative reciting at some length the preparations of the Du Pont Company for active participation in the dyestuffs field, including a forecast as to what specific colors might be expected to issue from their plants, together with statistics showing the probable extent of their manufacturing facilities, etc.

Much speculation is heard in the trade as to the extent and nature of the Du Pont activities in the dyestuff field. While this article gives little definite information, it outlines the general direction which these activities will take.

In this hope the writer was disappointed. Mr. Poucher is the most conservative of men and, in this characteristic, reflects the attitude of the entire Du Pont organization. Briefly, this attitude may be summed up in the expression of the good old maxim, "deeds, not words."

According to Mr. Poucher, the one concern of his department for the present is the production of colors—not the manufacture on a tremendous scale of staple products, easily made, which are the articles of quantity consumption at the moment, but the development in perfected form of those rarer colors for whose production exhaustive research and painstaking experimentation, backed by ample capital and equipment, are necessary.

In the development of a program of this sort publicity is of no value either to manufacturer or consumer and may be distinctly embarrassing to both. If, for instance, it were announced that the Du Ponts were working on and expected shortly to produce in commercial quantities certain colors in great demand among cotton converters and now practically unobtainable in this country, no good would be accomplished and much harm might be done. Converters might be led, because of the confidence which the name Du Pont inspires, to base their plans upon the assumption that early supplies of these colors would be available; yet, such are the uncertainties of any development of this nature, some unforeseen difficulty might, at the last moment, prevent the production in commercial quantities of products which had been quite successfully turned out in the laboratory.

For this reason no announcement or intimation is to be expected from the Du Pont Company until a color is actually being manufactured and, hav-

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ing met all final tests, is available for consumer use. Announcements will be made, however, as fast as colors are perfected and it is no breach of confidence to say that such announcements may be expected at more or less frequent intervals from now on.

At the present time the Du Pont Company is producing and shipping in quantity synthetic indigo, a product with which the leading German chemists wrestled from 1882 until 1897 and which, having produced, it took them until 1910 to introduce successfully into the American market. That this feat which took the Germans nearly thirty years has been accomplished by the Du Ponts in a few months speaks well for what may be expected in the future.

Speaking of the ability of the Du Pont interests to accomplish seemingly impossible tasks, it might be mentioned that at the outbreak of the war they found themselves suddenly called upon to increase tremendously their output of explosives and in the shortest possible space of time. Plans were approved for a plant at Hopewell, Va., the completed cost of which was in excess of $65,000,000.00. Competent engineers predicted that the erection of this plant would require more than two years, yet at the end of *seven months after breaking ground the entire plant was completed and in operation.*

An achievement of little less magnitude is in process of accomplishment in the dyestuffs plant at Wilmington. It is not permitted to give facts or figures but those who have watched the development of the works report that their vast extent, the care and foresight with which they are laid out and the rapidity with which they have been rushed to completion would be unbelievable were it not for the actual ocular demonstration. The writer was permitted to see panoramic photographs of the site occupied by the dyestuffs plant, taken at intervals of about thirty days from the beginning of construction down to the present time. We greatly wish we might reproduce them in the REPORTER as the series tells a story which it is quite beyond the writer's ability to narrate.

In regard to the permanency of the dyestuff industry in America, it is the conviction of the Du Pont interests that Germany will never be able to regain the trade of which war-time conditions have deprived her. In other words, Made-in-America Dyes have come to stay. The only thing which can defeat such a devoutly to be hoped for consummation, according to Mr. Poucher, is the failure of American manufacturers to produce the colors themselves. There is no basic material more readily accessible to Germany than to the United States; in fact, we are favored in all such respects. Neither is much stock to be taken in the so-called "secret formulas" of the Germans. The production in this country of any color which was formerly made in Europe is simply a matter of painstaking research and experimentation. There will no doubt be tariff protection, but an extreme tariff will not be essential so long as Germany is prohibited from selling here more cheaply than she sells in other parts of the world. And it is probable that even if she felt inclined to sell at a loss in this country in order to stifle American competition she would be financially unable to do so. At the close of the war German industry is not going to be able to spend millions in an effort to regain lost foreign commerce—at least she will not be able to do so if America does her part in seeing that the war results in an Allied victory. More than this, it must be remembered that Germany will not again in the near future be able to manufacture so cheaply as before the war. Her man-power will be vastly diminished, labor will be at a premium and every cost of production will be tremendously higher than previously.

For these reasons and to the end that the dyestuff industry in this country may be firmly and permanently established, it is the patriotic duty of every American manufacturer of dyestuffs to devote his every resource and bend his every energy to the development of colors which have not, up to the present time, been successfully produced on this side of the Atlantic. If these colors are not produced, it is unreasonable to

expect that our consumers, however patriotically inclined, will refrain from filling their needs from any available source. If, however, the colors are produced here it will be not only possible but profitable as well to sell them to American consumers even after German competition is restored.

There is no doubt that the next two or three years will prove to be the most trying time which consumers of dyestuffs in America have been called upon to face since the outbreak of the European war. During the past three years the textile mills of the country have been exceedingly fortunate in being able to secure dyestuffs which were even approximately suited to their needs. That they have been so able to continue in operation has been, in considerable part, owing to the fact that there were on hand in this country and elsewhere throughout the world fairly large stocks of German colors. This fact made it possible for the various textile mills to continue operations, for, in addition to curtailing consumption, there were exchanges of dyestuffs—the selling of something that was not wanted and the buying of something that was—and there was also the purchase of colors from other consuming countries, such as China, etc.

All of this is now at an end—the world is as bare of coal-tar dyes as of fats and oils. Hence, until the manufacture of the rarer colors such as were previously produced only in Germany is accomplished by American firms, our dyestuff consumers must reconcile themselves to facing conditions which will be far from favorable. Everything which can be done to produce these much-needed colors is being undertaken. It is confidently believed that the entrance of the Du Pont Company into the dyestuff field is most opportune and that their efforts along these lines will go far toward remedying the present conditions. It is obvious, however, that not all of the wanted colors—or, for that matter, any considerable part of them—can be produced at a moment's notice. In the meantime, while American capital and ingenuity are busy with these problems, it behooves dyestuff consumers throughout the country to be patient and to rest secure in the certainty that within a period of two or three years American manufacturers will be able to supply all of the deficiencies that now exist.

The Production of Coal Tar Crudes in America

(*Continued from page* 5)

increase in the percentage of by-product coke ovens, previously mentioned.

Another product obtained in the process of running coke oven gases to pitch is anthracene oil which yields anthracene, which, in turn, after purification, becomes the source of alizarin—an important product necessary to the manufacture of the so-called "alizarin" colors.

It is safe to say that the by-product coke ovens now established in America are ample to care for all the demands for raw material — benzol, toluol and their homologues — which our munition makers and dyestuff manufacturers will require. After the war, when the manufacture of explosives is reduced to a normal amount, these products will be available as motor fuel and will very likely come into general use for this purpose. The ordinary gasolene motor can be easily adapted for the use of benzol as fuel by slight adjustments of the carburetor.

As stated at the beginning of this article, a majority of the by-product coke ovens of the country are owned by the producing iron companies but in most cases the by-products themselves, which are not essential to the iron industry, are sold under contract to agents who merchandise these products. Chief among such selling agencies is the Barrett Company, which handles a large percentage of the available national supply. We have it on the authority of an officer of this concern that their supply of crudes is greatly in excess of the amount necessary to fill the requirements of the dyestuff manufacturers with whom they are affiliated and that the excess is available on an equitable basis to other manufacturers of intermediates and dyestuffs.

The Riverside Mills at Chester, Pa.

of

American Dyewood Co.

New York Boston Philadelphia

Hamilton, Ont.

Booth No. 275

DEVELOPMENT OF THE DYEWOOD INDUSTRY IN AMERICA

SINCE the outbreak of the war the greatest interest among consumers of dyestuffs throughout the country has naturally centered in the development of an American aniline dyestuff industry—this because of the complete cessation of importations from Germany which had been previously almost the sole source of supply. Great as our interest in the coal-tar dye industry may be, it must not be overlooked that natural dyestuffs — chiefly logwood products—have long been produced in this country and, in fact, that this particular branch of the dyestuff industry has long since reached a state of perfection in America not exceeded elsewhere in the world.

As a matter of fact, it is unquestionably due to the existence of this native American industry that a great many of our textile mills were able to continue in operation during the period following the outbreak of the war when stocks of German colors in this country had become practically exhausted and before the American manufacturers of aniline colors had been able to develop the necessary plants to supply consumer wants. For these reasons it has seemed to the editor of the REPORTER that a brief history of the development of the dyewood industry in this country ought to prove both interesting and instructive.

The manufacture of logwood extracts is an old-established American industry. In the midst of the interest aroused bv the development of aniline-dye making in this country we are prone to overlook this important fact.

The American Dyewood Company is the largest and most important manufacturer of natural dyestuffs in America. The company was incorporated in 1904, combining, as its name would indicate, the more important of the earlier existing American concerns manufacturing dyewoods. The history of these earlier concerns goes back to Revolutionary days.

The manufacture of dyewoods in America may be said to have started in New York with the pioneer predecessor of the American Dyewood Company, William Partridge, an English dyer. He founded in 1798, at Greenwich Village, a suburb of New York, now about West 10th street, the first dyewood mill in America. The power was furnished by a horse walking around a capstan. This device operated a small cutter provided with saw-tooth knives. The chips produced were treated to develop the coloring principle of the wood and the manufactured ware proved in every respect equal to the dyewoods then used in England.

The powerful cutting machines employed to-day at the Riverside Mills, Chester, Pa., of the American Dyewood Company, are capable of reducing a five-foot log into small chips in about seventeen seconds.

The Greenwich Village mill becoming inadequate to supply the demands for its product, Mr. Partridge removed his factory to Gravesend, back of Coney Island, where, by means of a wheel and with the utilization of the tide-water for power, larger works could be operated. In 1868 the rapidly increasing business necessitated better facilities, and the establishement was moved to Greenpoint, Brooklyn; and in 1872 the business was incorporated as the New York Dyewood Extract and Chemical Company.

During this development in and about New York, other dyewood mills were coming into being in America. In 1844

a dyewood mill was started at East Boston by William P. Porter; in 1869 it was consolidated with several other dyewood concerns dating from about the same period and incorporated as the Boston Dyewood and Chemical Company. In 1892 the Boston Dyewood and Chemical Company was consolidated with the New York Dyewood Extract and Chemical Company; in this consolidation was also included the Atlantic Dyewood Company, which had been organized some ten years previously. The name of the new corporation was the New York and Boston Dyewood Company, and its dyestuff business was consolidated with the Sharpless Dyewood Extract Company of Pennsylvania, in 1904, as the American Dyewood Company.

Of special interest as the direct predecessor of the present manufacturing plant of the American Dyewood Company are the dyewood mills that were operated in the vicinity of Philadelphia. In 1835 John M. Sharpless erected a mill for cutting dyewoods at Waterville, near Chester, Pa. The works, up to a comparatively late day, were operated by water-power only. The problem of conveying the wood from the wharf in Chester to Waterville was solved by building enormous wagons, with wide tires, drawn by tandem strings of six horses.

In 1895 the business was incorporated as the Sharpless Dyewood Extract Company. The growth and increase of the dyewood industry after 1850 and the necessity for quicker transportation facilities led John M. Sharpless & Co. to remove their works from Waterville and to purchase a tract of land at Chester, Pa., on the Delaware River, where they erected the considerable plant since known as Riverside Mills. The mills were fitted with the most advanced machinery, the installation being completed in 1879. Situated directly upon navigable waters, served by two or three lines of railroads, and possessing every facility for the landing of raw materials and the shipment of finished products, this company enjoyed increasing success for a quarter of a century.

In 1904 the dyestuff business of the Sharpless Dyewood Extract Company and that of the New York and Boston Dyewood Company were sold to the newly founded American Dyewood Company, a Pennsylvania corporation, capitalized at $2,144,000.00.

The combination of resources thus effected gave immediate impulse to the growth and progress of the dyewood industry. Within a year it became evident that the Riverside Mills offered better facilities for producing and distributing dyewoods than the other mills of the company and the manufacture of natural dyewood extracts and products was rapidly concentrated at Chester. This concentration involved a doubling of the capacity of the works to meet a corresponding increase in the company's business and further increases in capacity and output have since been made. The present capacity of the plant is the product of about 65,000 tons of dyewoods per annum.

The numerous symmetrical and substantial buildings of the Riverside Mills cover a large area of ground with a frontage of 690 feet on the Delaware River. The situation insures an abundant supply of pure water and all the advantages of a tide-water location and there are docking facilities to accommodate the largest vessels in the West Indian and Mexican trade. Most of the vessels docking at the company's piers come from the West Indies, particularly from Haiti and Jamaica; some are from Mexican or Central American ports; a few are coastwise vessels from New York and elsewhere.

The American Dyewood Company, through its subsidiary company, the Compagnie Haitienne, controls large tracts in Haiti, on which are virgin forests of logwood, and through this subsidiary it operates an overhead tramway from these forests to Port de Paix on the northern coast of Haiti for the transportation of logwood in the stick.

For dyewoods and their extracts the Riverside Mills of the American Dyewood Company are the great manufacturing center of America. For size of annual output they are not surpassed

by any similar factory in the world. In this, as in all other manufactures, great changes for the better have taken place in both methods and machinery, resulting in vastly improved products. In this march of progress the American Dyewood Company is ever in the van and the reliable quality of Riverside products has made them a standard among the consuming trade.

Dicks, David Company Exhibit

THE exhibit of the Dicks, David Company, Inc., at the Textile Exhibition, occupying booth No. 255 on the third floor, will include various kinds of fabrics dyed by American dyers using Dicks, David Company's products. Photographs of the Company's plants are also a feature of their exhibit. Those who will represent the Company at their booth are: Messrs. B. Franklin Lippold, Geo. C. Lommel, John Ward, Edw. Wheeler, Emil Coone, D. R. Harriman, Jr., and Irwin H. Crumley.

Among the products being manufactured by the Dicks, David Company are the following: Direct Colors, Direct Sky Blue, Direct Blue 2B, Direct Navy Blue B, Direct Fast Yellow R, Congo Rubine, Congo Red, Direct Fast Orange RR, Direct Pink, Direct Brown, Benzopurpurine. Sulphur Colors—Sulphur Khaki, Sulphur Brown, Sulphur Black. Acid Colors—Alkali Blue, Soluble Blue, Acid Black, Amaranth, Ponceau Scarlets, Acid Orange O, Bordeaux, Croceine Orange R, Acid Scarlet 3B, Acid Red A, Metanil Yellow. Basic Colors—Fuchsine Crystals, Fuchsine Powder, Methyl Violet, Methylene Blue, Safranine, Bismarck Brown, Chrysoidine. Alizarine Colors—Alizarine Yellow R, Alizarine Green B, Alizarine Blue Black, Alizarine Brown R. Oil Colors—Oil Black, Oil Yellow, Oil Orange, Oil Scarlet, Oil Red, Oil Brown, Nigrosines Water and Spirit Soluble.

Newport Chemical Works' Products

AMONG the large producers of intermediates and dyestuffs in this country is the Newport Chemical Works, Incorporated, whose plant is located at Carrollville, Wis. Up to the close of 1917 this plant was occupied almost entirely with the manufacture of intermediates alone, but since the first of the year they have been taking up the production of dyestuffs and we are informed are now producing, among others, the following colors: Newport Direct Blue 2B, Newport Direct Sky Blue, Newport Direct Blue 3B, Benzo Purpurine 4B, Benzo Purpurine 4B Conc., Benzo Purpurine 10B, Newport Acid Fuchsine, Newport Direct Orange R, Azo Eosine G, Newport Acid Black 4 AN, Newport Direct Green B, Newport Direct Steel-Blue G, Newport Sulphur Indone 2R, Sulphur Green G. New colors are being constantly added to the line.

The Heller & Merz Company, Hamburg Place, Newark, N. J., manufacturer of chemicals, etc., has had plans prepared for alterations and improvements in its plant.

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WHAT AMERICAN DYESTUFF MANUFACTURERS HAVE ACCOMPLISHED

THE story of dyestuff manufacture in the United States dates from 1879 when the Schoellkopfs at Buffalo commenced to manufacture. This story has been told so many times during the past few years that it seems almost superfluous to repeat it again. However, there are undoubtedly many persons more or less directly associated with or dependent upon the dyestuff industry in this country who have never fully comprehended the extent of the problems with which American manufacturers have had to contend or the really noteworthy results which they have achieved. Hence, for the benefit of those who have followed developments in this field only in a casual way, it may not be amiss to rehearse briefly the obstacles which have been overcome and the results which have been accomplished.

This article was written for the Reporter by a chemist associated with one of the largest American manufacturers of dyestuffs who has personally assisted in the accomplishments of which he writes. It is particularly interesting because of the bright outlook which it paints for the future of the industry in the United States.

In the early days of dyestuff manufacture in this country manufacturers were compelled to import, principally from Germany, the so-called intermediates, which, by processes well known to dye makers, were converted into the finished products.

The manufacture of intermediates is really the foundation of the dyestuff industry from the manufacturing standpoint. These intermediates in turn are made from the so-called "crudes," for example, benzol, toluol, xylol, phenol, naphthalene, anthracene and a few others of equal importance but which are obtained in relatively smaller quantities. The list of "crudes" enumerated above comprise: Those from which are obtained by far the largest number of so-called intermediates. For the conversion of these "crudes" into intermediates lengthy and often intentionally complicated processes must be used. Prior to the war these intermediates were obtained from abroad more easily and cheaply than they could have been produced in this country. The reason for this is evident. In England and in Europe generally the recovery and utilization of the "crudes" has long since been an established industry, while in this country the recovery of these "crudes" has been almost entirely neglected. An instance may be cited which will serve to show to what extremes industrial chemists were put at the outbreak of the war, *i. e.*, carbolic acid or phenol. This product was formerly imported in large quantities and to such an extent that all American demands were supplied. After hostilities broke out the exports from Europe of carbolic acid immediately ceased. On account of the demand for this product as the basic raw material for the manufacture of picric acid, an explosive, search was at once made for available sources of supply in this country, when it was found that the amount of carbolic acid normally obtained was relatively small. The constantly-increasing demand for it lead to its manufacture from benzol, and this sudden demand gave rise to the now important synthetic phenol processes that are carried out in various parts of the country.

The dyestuff manufacturer, on the other hand, was compelled to seek energetically a source of supply of the organic acids that play so important a part in his work. Aniline had been pro-

duced in this country in rather large quantities prior to the war; but, owing to competition from Germany, the output gradually decreased. After the outbreak of the war and when foreign supplies were cut off, constantly increasing quantities were manufactured at the plant of the Benzol Products Company. This plant has been considerably augmented in extent, so that it is now possibly the largest single aniline-producing plant in the world. From aniline the intermediate manufacturer produces a number of products that are important in dye manufacturing, among which may be enumerated nitro benzol, aniline hydrochloride, dinitro benzol, meta phenylendiamine, sulphanilic acid, amidoazobenzol, paraphenylendiamine, metanilic acid, nitro toluol, ortho nitro toluol, para nitro toluol, toluidines, ortho toluidine, para toluidine, para nitro ortho toluidine, toluylenediamine, nitro xylol and xylidines. This list shows in a comprehensive manner the difficulties that the industrial organic chemists encountered, but these difficulties have been gradually overcome so that at the present time additions are constantly being made to this list, with the result that a corresponding increase in the number of dyestuffs is likewise taking place.

The products above enumerated belong to what chemists term the Benzol series, of which there are several hundred which need not be listed here. These derivatives of Benzol are to be supplemented for the convenience of the dye maker with a long series of derivatives of Naphthaline, familiar to us all as Tar Camphor. From Naphthaline there are produced a number of very important Sulpho Acids which serve as the secondary intermediates for a very large number of commercially important dyestuffs. These Sulpho Acids fall into several important subdivisions; there are Mono Sulphonic Acids, Di Sulphonic Acids, Trio Sulphonic Acids, etc., together with substitute products in which the Amido group figures conspicuously. It is needless to enumerate these derivatives of Naphthaline. Suffice it to say that the American chemist has been called to the emergency and in attacking the problem of these complex and commercially important derivatives he has overcome difficulties during the last three years which, it is safe to say, have seldom been encountered by chemists in other branches of industry.

The chemical staff, in both the research and works departments of the National Aniline & Chemical Company, Inc., have applied themselves industriously and with success during the past few years to the production of some of these more important Sulpho Acids, with the result that the list of dyestuffs in which they play an important part has gradually been lengthened. None of these Sulpho Acids are easy to manufacture; they require extensive plant not only for their fabrication but also for their purification. It must be remembered that in the early days of the dyestuff industry in this country there were some points regarding the manufacture of these acids that were not thoroughly known, that while Sulpho Acid of a reasonably high de-

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gree of purity was obtained, the fact remained that there were some impurities that were difficult of removal, and it was to the removal of these impurities that the energy of a score of chemists was applied.

In the early days of the extended dyestuff manufacture in this country, succeeding the outbreak of the war, some of the finished dyes did not measure up to the standards previously known, particularly as to shade. This shortcoming was due not to the fact that we did not know in this country how to manufacture the dyes, but that the refining processes as applied to the intermediates were still somewhat imperfect. These difficulties have been in many instances entirely overcome, and in others the evil of their presence is being gradually lessened. It is only a question of time when the regular output of American intermediates will be uniform and of high standard.

The ramifications of the dyestuff industry are so varied that it is difficult to present a comprehensive survey of it within the compass of an ordinary article. The history of dyestuff development in this country must be written by someone who will be able to view in retrospect the work that has been done during the past forty-four months —work that has been accomplished by men laboring at high pressure and top speed.

American Color Mfg. Co. Products

THE American Color Mfg. Co., of Passaic, N. J., began the production of oil soluble colors in November 1916. The manufacture of these colors is still continued but since that time the Company has also taken up the production in large quantities of direct oil, chrysophenine, fast silk grey, sulphur green, chrome black, and a few other colors in small quantities.

The Crescent Color Company, West Front Street, Plainfield, N. J., manufacturer of dyestuffs, etc., has commenced the construction of a new addition to its plant. The structure is estimated to cost $20,000.

Civilization Against Kultur

E. C. Klipstein, President of E. C. Klipstein & Sons and Treasurer of A. Klipstein & Company, is the author of a very interesting little booklet entitled "The Struggle of Civilization Against Kultur," with the sub-title, "Four Thousand Years of Conflict." In this booklet Mr. Klipstein demonstrates clearly that the present world conflict is the final culmination of an age-long struggle of the Teutonic branch of the Aryan race to establish itself on the sea. He shows how this race has repeatedly assailed maritime powers of all ages, from the time of the early Greeks down to the present, and how their efforts have, in every case, been frustrated. This aim of the modern German empire is testified to by the inscription placed in every German merchant vessel—"Unsere Zunkunft liegt auf dem Meer"—"Our future is on the sea."

Mr. Klipstein points out that the Teutonic races have always been excellent fighters on land, but that they have always failed in an effort to develop equal maritime strength. The present conflict, he shows clearly, was inspired by the belief of the Germans that having subjugated Central Europe they would then be in a position to destroy the supremacy of Great Britain on the sea.

Mr. Klipstein has printed and is distributing widely this brochure at his own expense—an extremely patriotic action. Those who are interested may obtain copies by addressing A. Klipstein & Co., at 644 Greenwich Street, New York City.

The plant of the Logwood Products Corps., located in Haiti, is producing liquid logwood extract of 51° twaddle, without oxidation, the capacity of the plant being in excess of 150,000 lbs. monthly: operations were begun in 1917.

Additional Copies of this issue can be obtained

THE RECENT CONSUMPTION OF DYESTUFFS IN THE UNITED STATES

EDITOR'S NOTE: *Certain figures quoted in this article are based upon the results of an investigation conducted by the United States Tariff Commission covering the year* 1916. *The report of this investigation—such is the slowness with which government machinery moves—was only recently published. It is probable that if figures were available for* 1917 *their comparison with those of* 1913 *would show considerable changes as against the comparison between those for* 1913 *and* 1916. *In a general way, however, the principal points illustrated by the commission's investigation apply to conditions to-day as well as they did to those existing in* 1916, *and the author of the present article has brought out many of those points in a most interesting manner.*

THERE has been a vast amount of speculation for a year past as to the actual ability of our national dyestuff industry to meet, under existing conditions, the current demands of the textile and allied manufacturing interests for coloring materials. It is known, of course, that a very large number of specific dyes are unobtainable. The fantastic figures at which they are quoted, show that there is no domestic production and little or no importation from Switzerland or elsewhere.

On the other hand the output of our textile works has notably increased, and there is evidently a great consumption of dyes, and no particular complaint as to a pronounced shortage. Apparently the *volume* of coloring material required by textile and similar industries can be secured, even if the *variety* of colors is circumscribed.

It seemed desirable to the Tariff Commission to gain an approximate idea of current conditions, and it accordingly made inquiries of 77 prominent companies engaged in the manufacture, dyeing and finishing of textile fabrics, requesting data on the consumption of dyestuffs in 1913 and in 1916. The summary of the information thus obtained is exceedingly interesting.

The group of 77 companies used in 1913 dyestuffs to the extent of 33,403,406 lbs., valued at $6,841,527. In 1916, the consumption increased to 44,757,097 lbs., valued at $26,513,842.

First of all, this shows an average increase in quantity of 34 per cent. It is possible, if not probable, that the increase in actual coloring matter is less, due to a greater use of dyes in the form of paste.

In the next place, the increase in average value is striking. In 1913, the consumers paid, on an average, 20.5 cents per lb. for his colors. In 1916, the average rate was 59.2 cents—almost treble!

INCREASED USE OF NATURAL COLORS

It is interesting to note the extent to which natural colors displaced artificial dyes in general usage. We have been content hitherto with the general statement that there has been a very large substitution. Much of the effort of tinetorial chemists during the past two years has been, in fact, devoted to this field of substitution, and logwood has played the leading rôle. The report shows that cotton mills used nearly four times as much logwood in 1916 as in 1913. For woolens and silks there was an increase of about 500 per cent. Fustic was also employed to a notable degree. For cottons the increase was 1,100 per cent., for woolens 2,000 per cent. There was an increase of 540 per cent. in the use of sumach for cot-

ton goods, and of about 150 per cent in the use of cutch for silks and cottons.

Otherwise there was little apparent expansion in the use of natural colors for domestic needs, although very large amounts were manufactured for shipment abroad. The quantities of gambier and of quercitron varied little from the figures for normal years.

In addition to the heavy demand on a few natural dyes, as outlined above, it has been necessary to choose artificial colors for use in place of the convenient, fast vat dyes, of indigo to a considerable extent, and various indigoids, of numerous direct azo colors, of such dyes as primuline, rhodamine, benzopurpurine, etc.

The production of p-nitraniline and b-naphthol has assumed large proportions and the para-red is now doing duty for a variety of red tints. Much the same may be said of sulphur black and sulphur brown, now made on a large scale, and replacing, for the time being, a number of azo colors.

Some day a complete portrayal of the multitude of substitutions, now in current use in our country, will furnish entertaining reading.

At present we are interested in the verdict passed by these representative consumers of colors on the actual progress made by the new American industry.

There seems to be a general consensus of opinion that the industry has accomplished all and more than could be expected in the brief period of its growth. Here and there attention is called to minor failures, especially in connection with dyes for cotton, to meet the full standards of uniformity of tint and fastness to which the users of foreign colors have been accustomed in the past. It is, however, frankly recognized that occasional failures are inevitable when making a bold effort to accomplish much in a very brief time. Numerous colors are perfectly satisfactory. Where defects in others have been found, the quality is being steadily improved. The dyes designed more specifically for use on woolen goods are pronounced fully equal in fastness, quality and uniformity to the corresponding colors made abroad.

Industry on Permanent Basis

IN general, consumers of dyestuffs feel convinced that the industry is established in the country upon a permanent basis, and that it is in the hands of men who are determined to make it respond completely to the needs and wishes of the vast multitude of those dependent upon the factor of color. Expression is also given to the conviction that legislation must adequately protect the young industry. If this is the case, it is felt that the competitive struggle for excellence between the American manufacturers will shortly assume the regular production of the very highest grades of colors in ample quantity to meet the needs of the entire American market. It will necessarily involve a very careful and comprehensive study of a multitude of varying factors to determine just what degree of protection is required by the different categories of high-grade colors in order to effectively preserve the American market during the initial years of experiment and adjustment. There should be, however, little question as to the readiness of political parties to grant the requisite measure of protection, when both producers and consumers demand it and when determined effort is made to establish it upon an equitable and scientific basis.

Furthermore, it is necessary that the entire industry, from crudes to finished products, as well as the collateral classes of coal-tar products used in medicine and the arts, should be exhaustively studied, and that proper provision should be made to insure the protection of *all* these compounds from American coal-tar.

Notice to Subscribers

Owing to the disturbance caused by war conditions in the postal service, we cannot guarantee prompt delivery of this journal through the mails. For delays in such delivery, while they should be reported at once to this office, we cannot accept blame.

AMERICAN

AS American Manufacturers of a high-grade line of Aniline colors suitable to the textile trades, we will exhibit at the Textile Show fabrics and materials dyed by American Dyers under actual business conditions.

We extend you a cordial invitation to call at Booth 255, third floor, Grand Central Palace, April 29 to May 11, 1918.

BASIC COLORS:

Fuchsine — Methylene Blue — Bis. Brown
Methyl Violet — Safranine — Chrysoidine
Malachite Green — Auramine

DIRECT COLORS:

Direct Sky Blue — Direct Fast Yellow R — Congo Red
Direct Blue 2B — (leaves silk white) — Direct Fast Orange RR
Direct Navy Blue B — Congo Rubine — Direct Pink
Direct Brown — Benzopurpurine

SULPHUR COLORS:

Sulphur Khaki — Sulphur Brown — Sulphur Black
Sulphur Green

ACID COLORS:

Alkali Blue — Acid Orange O — Amaranth
Soluble Blue — Bordeaux — Acid Scarlet 3B
Ponceau Scarlets — Croceine Orange R — Acid Red A
Metanil Yellow — Acid Black

ALIZARINE COLORS:

Alizarine Yellow R — Alizarine Brown R — Alizarine Blue Black
Nigrosines Water and Spirit Soluble — Oil Colors

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Exhibit of "National" Colors

It is now generally conceded that the appearance of the present National Aniline & Chemical Company, Inc., with its several plants covering the manufacture of dyestuffs from bases through intermediates to the finished color, marked the fixation of dyestuff manufacture here in America. At the Sixth National Textile Exhibition, which is now being held at the Grand Central Palace, New York, this company occupies a large corner space on the Fourth Floor, where are being shown some of the achievements that have marked the progress of the art during the past year. A feature of the exhibition is a display of dyeings of some fifty "NATIONAL" colors, alongside of which are shown dyeings of the same class of colors of German manufacture. These dyeings of

American Colors *versus* German Colors

are subjected to the same tests of scouring, fulling, and exposure to light and weather, with the purpose of illustrating more fully than has heretofore been attempted the exact status of American dyes as compared with similar dyes of foreign manufacture. We invite from the textile trade, as well as from the public, a most careful scrutiny of this exhibit. If it be examined with a knowledge of the work of our Research Department the well-informed will at once recognize that the promises of this company are gradually being fulfilled, and that "NATIONAL" colors within a reasonable time will form an adequate and comprehensive line.

National Aniline & Chemical Company

INCORPORATED

21 Burling Slip, New York